CLAIMS

1. A multi-parameter water quality monitoring system comprising:

a plurality of multi-parameter monitoring tools each configured to receive and electrically interconnect with a plurality of interchangeable sensor head components and to communicate over a communications network; and

a central controller connectable to the communications network, said central controller is configured to communicate with each of the multi-parameter monitoring tools, wherein the central controller includes functionality to receive configuration information for each of the plurality of interchangeable sensor head components interconnected with each of the plurality of tool assemblies and to extract operational information therefrom.

2. The system of claim 1 wherein the central controller is further configured to detect each of the tool assemblies connected to the communications network, selectively access each of the one tool assemblies, and communicate with each of the tool assemblies so as to access, amend, and retrieve information stored in the accessed tool assembly, including data relating to each of the interchangeable sensor head components interconnected with the accessed tool assembly.

3. The system of claim 2 wherein the central controller is further configured to selectively address each of the tool assemblies by placement of a unique address header in a message generated for transmission over the communications network.

4. The system of claim 2 wherein the operational information includes identification for each of the interchangeable sensor head components interconnected with a particular one of the plurality of multi-parameter tool assemblies.

5. The system of claim 4 wherein the interchangeable sensor head components comprise at least one of: an interchangeable sensor and an accessory.

6. The system of claim 5 wherein the operational information for the interchangeable sensor may further include calibration data.

7. The system of claim 5 wherein the plurality of interchangeable sensors are configured for monitoring at least one of the following parameters: includes conductivity, dissolved oxygen, pressure and/or turbidity, oxidation reduction potential (ORP), chloride, nitrate, chlorophyll, ammonium, and temperature.

8. The system of claim 5 wherein the accessory may comprise at least one of: a stirring device, a wiper device, and a shutter device.

9. The system of claim 2 wherein each of the tool assemblies further includes a plurality of ports each configured to engage and provide an interconnection with the interchangeable sensor component, the central controller is further configured to receive and process information relating to detection of insertion of one of the interchangeable sensor head components in one of the sensor ports and compatibility between the port and the interchangeable sensor head component inserted therein.

10. The system of claim 1 wherein each of the monitoring tool assemblies may be further configured to communicate directly with at least one other tool assembly over the communications network.

11. The system of claim 1 wherein the communications network comprises at least one of: the Internet, public switched telephone network (PSTN), a wireless telephone network, and radio waves.

12. The system of claim 1 wherein the plurality of tool assemblies are located at a site remote from the central controller and connection to the communications network is provided through use of a modem/controller device.

13. The system of claim 12 wherein the modem/controller employed for communicating over the network includes the functionality to emulate at least one other system such that communications may be established with devices other than the central controller.

14. The system of claim 1 wherein the central controller comprises at least one of: a personal computer, a palm top computer, a well top device, and another tool assembly.

15. The system of claim 2 wherein the central controller is further configured to present information relating to each of the tool assemblies in communication with the central controller, wherein the information includes each type of the interchangeable sensor head component interconnected with the sensor head of the at least one tool assembly.

16. The system of claim 5 wherein the central controller is further configured to generate and amend a test schedule for each of the interchangeable sensors in the tool

assembly, and to further access and extract data stored in memory for monitoring processes performed by each of the interchangeable sensors in the tool assembly.

17. The apparatus of claim 5 wherein the central controller further comprises at least one user interface which is configured to display a plurality of screen displays which provide for the viewing and/or manual entry of information relating to the operations of the at least one tool assembly including the data for each of the interchangeable sensor head components connected thereto user commands.

18. The system of claim 17 wherein the central controller is configured to perform at least one of:

detecting whether the at least one tool assembly is connected to the network;

detecting which of the interchangeable sensor head components is interconnected with the at least one tool assembly;

presenting a first screen display which provides detail configuration for the at least one tool assembly connected to the communications network including the data for each of the interchangeable sensor head components connected thereto;

presenting a second screen display which provides for manual entry of parameter information for each of the interchangeable sensors interconnected with the at least one tool assembly, wherein the entered parameter information is provided to the at least one tool assembly over the communications network; and

presenting a third screen display for manual entry of testing information for each of the interchangeable sensors interconnected with the at least one tool assembly, wherein the entered test information may be provided to the at least one tool assembly over the communications network; and

extracting and compiling test information for each of the interconnected interchangeable sensors from the at least tool assembly.

19. The system of claim 5 wherein the central controller comprises at least one of:

a communications processing module which provides for the identification of at least one tool assembly connected to the communications network and processing of messages which are received and transmitted over the network;

a parameters processing module which provides for identification and amendment of parameters for each of the interchangeable sensors interconnected with the at least one tool assembly; and

a test processing module which provides for identification and amendment of test procedures employed by the at least one tool assembly for each of the interchangeable sensor interconnected with the at least one tool assembly, as well as extraction of data for tests performed by each of the interchangeable sensors.

20. The system of claim 1 wherein the at least one tool assembly is adapted for monitoring water quality in at least one of: ground water, surface water, and a flow cell.

21. The system of claim 3 wherein the message may comprise firmware which the tool assembly may employ for upgrade and/or replacement purposes.

22. A method of measuring dissolved oxygen in a liquid, comprising the steps of:

(a) positioning the dissolved oxygen sensor in the liquid to be monitored;

(b) initiating a pulse of a predetermined magnitude for a first predetermined period of time across electrodes in the dissolved oxygen sensor;

(c) measuring a magnitude of the current across the electrodes at a second predetermined period of time after the initiation of the pulse; and

(d) based on the second predetermined period of time, identifying a correction value which is addable to the measured magnitude to identify a final dissolved oxygen measurement.

23 The method of claim 22 further comprising the steps of:

digitizing the final dissolved oxygen measurement; and

storing the digitized measurement in memory for future access.

24. The method of claim 22 further comprising performing steps b-d on a periodic basis, where each period lasts third predetermined period of time, where the third period of time is significantly longer than the first period of time.

25. The method of claim 22 wherein dissolved oxygen sensor is part of a multiparameter monitoring tool which includes at least one other sensor.

26. The method of claim 25 wherein steps b-d are performed in a repeating sequence which includes operations performed for the at least one other sensor.

27. The method of claim 22 further comprising the step of receiving a request for a dissolved oxygen value, whereupon at least one of the following steps are performed:

retrieving the digitized measurement from memory;

immediately performing steps b-d; and

where steps b-d are performed on a predetermined basis, waiting until a third predetermined period of time passes, and then performing steps b-d.

28. The method of claim 22 wherein the correction value employed is directly related to at least one of: a magnitude of the second predetermined period of time and a magnitude of a third period of time, which comprises a time period between the termination of the pulse and initiation of a next pulse.

29. The method of claim 22 wherein the liquid comprises at least one of: ground water, surface water, water flowing through a flow cell.

30. A multiparameter monitoring system comprising:

a microprocessor device configurable for electrically communicating with a plurality of sensor devices, wherein each of the plurality of sensor devices is electrically connectable to the microprocessor over at least one unactivated circuit configured for monitoring at least one parameter; and

at least one high impedance buffer device positionable in each of the at least one unactivated circuits which is configured to reduce current magnitude through the at least one unpowered circuit.

31. The system of claim 30 wherein the high impedance buffer device comprises a micro-powered operational amplifier.

32. The system of claim 31 wherein the sensor device includes at least one of: an active sensor and a passive sensor.

33. The system of claim 32 wherein the operational amplifier employed for the active sensor include a capacitive device connectable at the operational amplifier output for minimizing current drive to unpowered circuitry and a resistive element connected between ground and the operational amplifier output to provide DC bias.

34. The system of claim 32 wherein the operational amplifier employed for the passive sensor include a large magnitude resistive element at the operational amplifier output for minimizing current drive to unpowered circuitry.

35. The system of claim 31 wherein the at least one circuit further includes signal conditioning devices and switching elements.

36. The system of claim 30 wherein the at least one parameter relates to water quality.

37. The system of claim 36 wherein the plurality of parameters include at least one of: conductivity, dissolved oxygen, pressure and/or turbidity, oxidation reduction potential (ORP), chloride, nitrate, chlorophyll, ammonium, and temperature